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PROCEEDINGS OF THE

AMERICAN SOCIETY OF CIVIL ENGINEERS

VOLUME 82

BASIC REQUIREMENTS FOR MANUSCRIPTS

This Journal represents an effort by the Society to deliver information to the reader with the greatest possible speed. To this end the material herein has none of the usual editing required in more formal publications.

Original papers and discussions of current papers should be submitted to the Manager of Technical Publications, ASCE. The final date on which a discussion should reach the Society is given as a footnote with each paper. Those who are planning to submit material will expedite the review and publication procedures by complying with the following basic requirements:

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2. A 50-word summary should accompany the paper.

3. The manuscript (a ribbon copy and two copies) should be double-spaced on one side of 8½-in. by 11-in. paper. Papers that were originally prepared for oral presentation must be rewritten into the third person before being submitted.

4. The author's full name, Society membership grade, and footnote reference stating present employment should appear on the first page of the paper.

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8. Papers should average about 12,000 words in length and should be no longer than 18,000 words. As an approximation, each full page of typed text, table, or illustration is the equivalent of 300 words.

Further information concerning the preparation of technical papers is contained in the "Technical Publications Handbook" which can be obtained from the Society.

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Journal of the

AIR TRANSPORT DIVISION

Proceedings of the American Society of Civil Engineers

AIR TRANSPORT DIVISION
COMMITTEE ON PROGRAMS AND PUBLICATIONS
John H. Jones, Chairman; Robert W. Gerdel; Ronald M. White;
Max Weinroth; Philip A. Hahn;
Robert Horonjeff, Executive Committee Contact Member.

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Paper 1109 AT 3

Journal of the
AIR TRANSPORT DIVISION
Proceedings of the American Society of Civil Engineers

AIRPORT AND CITY PLANNING[a]

Leigh Fisher[1]
(Proc. Paper 1109)

SYNOPSIS

The author, studying the thesis that there is insufficient correlation between planning for airports and regional development planning, analyzes the specific factors which should be considered to achieve better integration of the airport with the community which it serves. Ground transportation, airport-to-community distance, approach zoning, noise nuisance, and land use are some of the factors considered in the author's analysis.

In the last few years there has been a growing recognition that, in most cases, the airport plan has had no specific relationship to the over-all city plan. This situation has developed through technical changes in airport requirements and types of use, and as a result of changes in the aircraft itself. It can, in addition, be attributed to the rapid urban growth of our major metropolitan centers.

Those new postwar airports which have been developed, in general have recognized the importance of airport development to community growth, compatibility of adjoining land use, protection of property values, and the many economic factors which both affect the airport's location and surrounding land use. In the majority, however, pre-war airports have been expanded, modified, and improved to accommodate postwar air traffic growth, and have not as yet, been properly integrated with the over-all city plan. In years to come, it can be expected that the pressure of integrated growth of major metropolitan areas may force the relocation of many major airports to sites more compatible with the over-all city plan and with adjoining land use.

It should be specifically recognized that these observations relate only to

Note: Discussion open until April 1, 1957. Paper 1109 is part of the copyrighted Journal of the Air Transport Division of the American Society of Civil Engineers, Vol. 82, No. AT 3, November, 1956.

a. Presented at a meeting of the ASCE Convention, February 14-17, 1956, Dallas, Tex.

1. Leigh Fisher & Associates, South Bend, Ind.

airline and major aircraft manufacturing airports. They do not cover airport locations of the general aviation type normally found on non-airline airports. The primary problems today, as far as the integration of airport and city plans are concerned, include those now being encountered and forecast for the near future with regard to airline airports accommodating turbo-prop and turbo-jet aircraft along with the heavier, conventional reciprocating engine aircraft.

Primarily, the conclusions presented in this paper pertain to airports of the types serving communities of 200,000 population or more with average air passenger trip lengths in excess of 250 miles. At these communities, the integration of the airport plan with the over-all city plan is a function of many widely varying factors including the city size, the economic base of the community, the average trip length of air passengers and the source of air passengers within the metropolitan area. Air passenger traffic generated by community depends upon the size of the community and the economic and geographic characteristics of that area. The population of the area and its economic structure are, however, inter-related variables, and the composition of employment in each community to a great extent determines the degree of air passenger generation.

To determine the maximum allowable distance at which an airport should be located from a given community, analysis of the average air passenger trip length and of the composition of air passenger trip lengths is absolutely essential. Where trip lengths are predominantly in excess of 600 miles, an airport might be located further from the community and still attract maximum air passenger traffic; conversely where the trip length is under 300 miles, close-in airport location is dictated if a continued high volume of air passenger activity is to be assured.

Scheduled air passenger traffic generates from a widespread geographic area with boundaries varying in direct proportion to the frequency and adequacy of scheduled air service offered at the nearest competitive airport and to the length of air passenger trip. Attraction of scheduled air passengers involving surface travel for distances up to 100 miles is not considered unusual for major metropolitan areas, especially for air trip lengths in excess of 600 miles.

In determining air traffic potential for a given community, Mr. Graham Aldrich of the Research Division, Air Transport Association of America, presented a paper which showed that a near saturation of long-haul traffic had been achieved by the airlines and indicated that future penetration of the common carrier passenger traffic by airlines must be attained in shorter haul markets. A convenient airport location is therefore essential if the short-haul market is to be successfully penetrated by airline service. It is absolutely essential that convenient ground access be provided to the airport which, of course, affects the over-all city plan to the extent that highways, thruways, toll roads, etc., are integrated with the airport location. The growing importance of proper integration of the highway pattern with an airport can be forcefully pointed out by an analysis of the changes in pattern of ground transportation habits of air passengers during the postwar years.

The author's firm is currently engaged by the Minneapolis-St. Paul Metropolitan Airports Commission with reference to the $35,000,000 terminal area program. The assignment on this project is to assure its integration with over-all community growth, sources of passenger traffic, and general area development. In connection with this project, a comparative study

covering the period 1947-1955 showed that airline passenger use of private cars increased from 35% in 1947 to 46% in 1955. During this same period, the use of taxicabs increased from 10% to 18%, while limousine or airport coach service dropped from 33% to 14%. This situation can be observed at most major metropolitan airports throughout the United States.

As the communities have grown closer to the airports, the use of private cars and taxicabs has increased phenomenally, at the expense of fixed-point ground transportation service such as airport coach or limousine service. It is expected that in the future, an ever-growing proportion of air-passenger ground transportation will be accomplished by the private car, taxicab and "rent-a-car" which means that the highway access to the airport is of primary importance if airports are to be properly integrated with the city plan to serve the various geographical segments of the communities. Therefore, it can be observed that the emphasis on "downtown-to-airport" highways has been changed by experience to a need for over-all highway integration to serve the entire area.

The growing interest in helicopters should be given recognition in any discussion of an airport and the over-all community development as related to ground transportation. Many community planners, when facing the problem of integrating an airport into a community plan, use the helicopter as a convenient excuse for moving the airport further out into the country stating that "downtown-to-airport" helicopter services will overcome the disadvantages of distant airport location. If, however, the use of private cars and taxicabs is increasing, any helicopter service from downtown to the airport faces the same limitations and disadvantages as does the limousine or airport coach service which is, basically, a common carrier service from one fixed point to another. The primary reason for the decline in the use of limousine and coach services is that in addition to the limousine or coach segment of the ground transport trip, air passenger must use taxicabs or other ground conveyance to complete their trip to the final point of destination or from their point of actual origination to a limousine or coach service pick-up point.

There seems to be a growing feeling in the aviation industry that helicopters will be used primarily for inter-city service and to enlarge the community of interest of regional airports. This means that helicopters will haul passengers from outlying suburban communities and from communities of up to 100 miles as a feeder service into regional airports for reboarding and direct non-stop air service on conventional aircraft to ultimate destination. Helicopters are also expected to give "downtown-to-downtown" inter-city aero-bus service with some limited connections from the down-town areas to the regional airports as continuations of through trip service from the outlying communities. However, with the exception of major metropolitan areas with geographic problems such as the San Francisco-Oakland Bay area, the Los Angeles area, the Greater New York area, and suburban service in areas such as Detroit, Miami, and Chicago, the use of helicopters in lieu of coach or limousine ground transportation should not be anticipated as a solution to the problem of airport convenience.

Consistently, over the years, faster aircraft have required longer runways and more extensive cleared approaches, and the noise nuisance is an ever-growing public relations problem. These factors have forced many airport planners to push airports further from the centers of the metropolitan areas which they serve. In many cases it has become faster to resort to intercity

surface transportation, especially if the flight would be of a short-haul nature and the respective airports located far from community centers.

A specific example of the aftermath of this type of solution can be seen in the substantial loss of the Detroit-Cleveland air traffic when Detroit's airport was moved from the centrally located Detroit City Airport to Willow Run, located some 32 miles from the center of Detroit. In the Dallas-Fort Worth area similar results were observed when the Fort Worth airport was moved from Meacham Field to Amon Carter Field, located between Dallas and Fort Worth. In the period 1947-1950 approximately 14% of the Midland, Texas, air traffic went to and from Fort Worth through Meacham Field. After the change to Amon Carter Field, Midland's air traffic to Fort Worth reduced to 7% and the Dallas traffic increased some 5%. These are but two of many examples which prove the direct and immediate effect which airport convenience and ground accessability has on the short-haul air traffic market.

A paralleling factor which should be observed is the strong public preference for highway travel for trips of less than 200 miles in the absence of offsetting geographic factors. If an airport is located too far from city centers and the passenger is required to travel a considerable distance by private car, a substantial fraction of these prospective passengers will make the trip by private automobile since passengers usually measure the enroute time as the time elapsed from the beginning of the trip to the airport to the end of the trip from the airport at the city of destination. As a rule of thumb, an airport serving air traffic predominately of a 250-mile trip length should be located no further than 10 miles from the center of the downtown area and 8 miles from the center of local air-passenger origination-destination. Any lesser distance will substantially increase air traffic volume at that airport. For communities with longer air-passenger trip lengths, the distance can be increased in general proportion up to a maximum of 16 miles from the center of the downtown area and 12 miles from the center of local air-passenger origination-destination in lieu of extenuating local circumstances. All of these factors must be recognized if the airport is to be properly integrated into the community plan.

In addition to the economic and location factors, the problem of integrating an air carrier airport into the community plan is directly related to the technical factors of airport design, approach protection, noise levels, and to the anticipated type of aircraft equipment. In January, 1956 a meeting of the airline representatives, airport operators, the Civil Aeronautics Administration, and other interested officials was held in Washington for the purpose of discussing and coordinating airport requirements for jet aircraft these discussions may lead to changes in the maximum design criteria for airport landing areas by the CAA. The advent of commercial jet transports will create problems in the design and location of airports developed to serve such transports for the next 15 years. Thereafter, engineering research and development can be expected to bring about more efficient and quieter jet engines, improved aerodynamic characteristics and other methods of reducing landing and takeoff distances thus permitting steeper approaches and generally making these aircraft more usable in airports proximate to and integrated with metropolitan areas. However, for the next 10 to 20-year period, growing problems of airport compatibility with adjoining land use will have to be anticipated and solutions developed.

A recent study prepared by the Cornell-Guggenheim Aviation Safety Center, entitled "Steep Gradient Aircraft," points out that solutions to the problems of

near-vertical or very short take-off and landing are at hand and only need intensive development and application to produce steep gradient types of aircraft. They forecast a technical evolution of major proportions as a result of current research and development in rotary-wing aircraft, jet engine/aircraft-weight ratios, and boundary layer control. The conclusion of this report, however, indicates that the hoped-for solutions to the aggravating problems of longer runways, flatter approaches, and increased noise levels, will not be achieved in the near future and, until steep-gradient aircraft are available in quantity and on a dependable basis, relief from some of our current airport problems should not be anticipated.

In this paper airport approaches are discussed to the extent necessary to indicate their effect on adjoining land use, property values, and integration of the airport plan with the over-all community plan. The Doolittle Report recommendations of a fan-shaped zone 2 1/2 miles long and 6,000 feet wide at its outer limits, with restrictions against the use of land for the erection of places of public assembly, and restricting residences to the more distant locations within this zone has become common public knowledge. Because of the necessity for substantial land acquisition if these recommendations are to be followed, and in the opinion of the author, they must be followed for a safe airport location, an airport planner must look for an airport site in proximity to unproductive land or large bodies of water for the approaches thus removing the need for land acquisition or semi-confiscatory zoning regulations within these approach areas. For example, it would require approximately 7,500 acres of land to provide a 10,000 foot runway having these clear-zone requirements. At the current market value of raw land in many metropolitan areas, this would mean a land cost in excess of $25,000,000 for the site alone.

The noise problem should not be lightly considered. In a 1955 Memphis, Tennessee meeting, the Director of the Construction and Evaluation Service of the Veterans Administration stated, "The jet plane has immeasurably increased the hazards and annoyances to residents in proximity to airports." He further stated that these forerunners should "serve as warnings that appraisers should give very serious consideration to the effect of airports upon the desirability of adjacent housing." As a direct result of this policy, the boundaries fixed by FHA and Veterans Administration for mortgage loans at San Diego, California, around Miramar Naval Air Station in August, 1955 were specified as a 20,000 foot radius. This element must be considered when fitting the airport into the over-all community plan.

While airport approach zoning may restrict the height of structures and natural objects, the advisability of complying with approach zone limitations of the Doolittle Report indicates that a long-term suitable airport site would have approaches clear of dwellings and places of public assembly for a distance approximately 2 1/2 miles from the runway threshold which would also substantially alleviate problems of noise-nuisance in the approach areas. The future use of the land area within runway approaches must complement the demand for land use in the metropolitan area plan and made compatible therewith. This requires a complete analysis of the city plan with relationship to schools, highway access, availability of public utilities and services, common carrier bus and ground transportation, and other factors of general population development.

The problem of noise-nuisance can be expected to increase until engineering research and development perfects jet engines, such as the Conway

by-pass type, which reduce noise to acceptable levels. At airports close to major metropolitan areas, and with residential and cultural development in close proximity, it can be anticipated that manufacturing and military airport users may, in the future, be required to fix a maximum noise-level rate for aircraft equipment to be operated from such airports, agreeing to operate at those airports only such aircraft as will not exceed the specified noise levels. These maximum levels can then be translated into land-use patterns based upon acceptable and compatible land users as related to the established noise level limitations.

All of these considerations lead to the actual integration of the airport plan with the city plan. For new airports, the problem is substantially simplified. Even at many inland communities, airport locations are available where approaches can be placed over unproductive land, thus removing the necessity for land acquisition and assuring compatible land use. A year and a half ago the author's firm was engaged by the City of Tulsa to select a site for an auxiliary airport to relieve traffic congestion at Tulsa Municipal Airport. It was possible to find a site meeting all the criteria and located within 9 miles of the center of Tulsa and within 5 miles of the center of air passenger and executive aircraft ownership. Runways were oriented so that the approach zones passed over the river-bottom lands of the Arkansas River and the floodlands of Coal Creek and Polecat Creek. Thus, the total site requirements for an "express category" airport comprised some 800 acres and the flight paths over the river bottoms and natural drainage channels will maintain acceptable noise levels. The Tulsa Metropolitan Area Planning Commission thus was able to integrate this airport into the over-all city and area plan, assuring continued high value of adjoining land use and therefore compatibility.

A different problem, however, is encountered when an existing airport is to be expanded for long-term use. Usually residences, factories, places of public assembly, and dense development are found within the approach zones. A solution is developed through re-evaluation of the city plan and analyzing the comparative net cost to the community of continuing the airport thus making necessary adjustments and zoning provisions for residential density, industrial use and provision of public areas such as parks, as compared to the net cost of airport relocation, provided suitable sites are available. It is absolutely necessary that the airport and city planners recognize that the primary function of the airport is to serve the community involved. Engineers, city planners, and airport operators must recognize that the development of comprehensive land-use zoning around major airports will have to be prepared on a mutually acceptable basis to the best interest of the community involved. To meet approach- and sound level-zoning requirements an ideal airport would be surrounded by landscaped planted buffer strips with the next contiguous area being used for manufacturing and commercial purposes, again separated by landscaped buffer strips from the residential areas which would be the furthest distant from the airport proper. With this pattern, compatible land use and noise suppression by distance, terrain, sound and structural attenuation, and reflection would be maximized.

An element in city planning which could be of assistance in making airports compatible with adjoining land use would be better techniques for controlling the scattered population growth and urban decentralization. Specific state enabling acts permitting a community to control rates of growth would be of substantial assistance in encouraging a more integrated growth, better public

services, schools, highways, police, and other municipal services thus assuring development in a generally contiguous area. In view of the possibility of future improvements in aircraft approach patterns and noise levels, restricting the areas adjoining airports to a low building priority and allocating higher priorities to areas more distant from the airport, would result in low rates of growth around airports thus encouraging compatible airport-community development as well as substantially contributing to the solution of many of the problems of providing municipal services to a scattered and unplanned suburban growth.

Integration of airports with city plans is a pioneering venture and the specifications, terminology, phaseology, prohibitions, and permitted uses will have to be developed by original research. But even before the research must come a full recognition of the problems involved, the future noise levels, and the exposures to hazard. The development of the modern airport has evolved as a new type of land use and brings with it many problems unforeseen in the past. As a result, the airport cannot be located or zoned on a segregation basis of city planning, but rather must be integrated with the land use and community area on a performance basis. As in the case of all progressive city planning, it is not what is placed in an area, but where it is placed in relationship to adjoining land use that will permit realization of over-all long-term goals of the city plan.

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(Proc. Paper 1110)

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by Robert Horonjeff and John Hugh Jones (closure) 1110-3

A Pattern of Interstation Airline Travel, by D. M. Belmont. (Proc. Paper 987. Prior discussion: none. Discussion closed.)
Corrections 1110-5

Note: Paper 1110 is part of the copyrighted Journal of the Air Transport Division of the American Society of Civil Engineers, Vol. 82, AT 3, November, 1956.

Discussion of
"THE EFFECT OF TRAFFIC UPON RUNWAY PAVEMENT CROSS-SECTION"

by Robert Horonjeff and John Hugh Jones
(Proc. Paper 720)

ROBERT HORONJEFF[1] and JOHN HUGH JONES,[2] ASSOCIATE MEMBERS, ASCE.—Mr. Williams has called to the attention of the writers a mistake in the construction of the nomograph which appears as Fig. 10. The basic error lies in the placement of scales B and C. In the example used to illustrate the procedure the pavement thickness from the nomograph is within a few inches of the thickness arrives at by use of the formula $T = \frac{KP \; a \log r \frac{90-R}{100}}{5 \; c}$.

A corrected nomograph is included with the closure.

With respect to the reduction of asphalt surfacing to two inches the writers feel that this is justifiable since the amount of traffic on the outer portion of the runway, as demonstrated by the tests, is negligible. On many airports throughout the country the asphalt thickness is only two inches and has proven satisfactory. The Civil Aeronautics Administration has recommended the use of 2 inch surfacing for certain classes of airports. It is the writers' opinion that there is little need for placing a heavy thickness of asphalt in areas where there is only occasional traffic. Asphalt surfacing requires kneading action to prevent it from becoming brittle. In the writers' opinion, many cracks on the outer portion of runways are due to lack of kneading action and not to traffic.

The writers agree that the cost of excavating the subgrade should be included in a comparison of costs for a specific project. It was felt that this was not necessary for the generalized comparison. Furthermore, if the site requires both excavation and embankment, the profiles for the suggested design might be established in such a way that the grading would not be more costly than for the uniform thickness section.

The writers are in agreement with the statement made by Mr. J. F. Redus. The traffic pattern at large civil airports is fairly well established since it consists mostly of transport aircraft. Interviews with a number of pilots indicate that every effort is made to land on the central portion of the runway. Often pilots execute a "missed approach procedure" in order to avoid landing on the outer portion of the runway. From a safety standpoint there are many reasons for keeping the aircraft in the central portion of a runway both for take-offs and landings. A staggered pattern of take-offs is of course not permitted in civil operations, consequently the patterns at civil and military fields could be quite different as pointed out by Mr. Redus.

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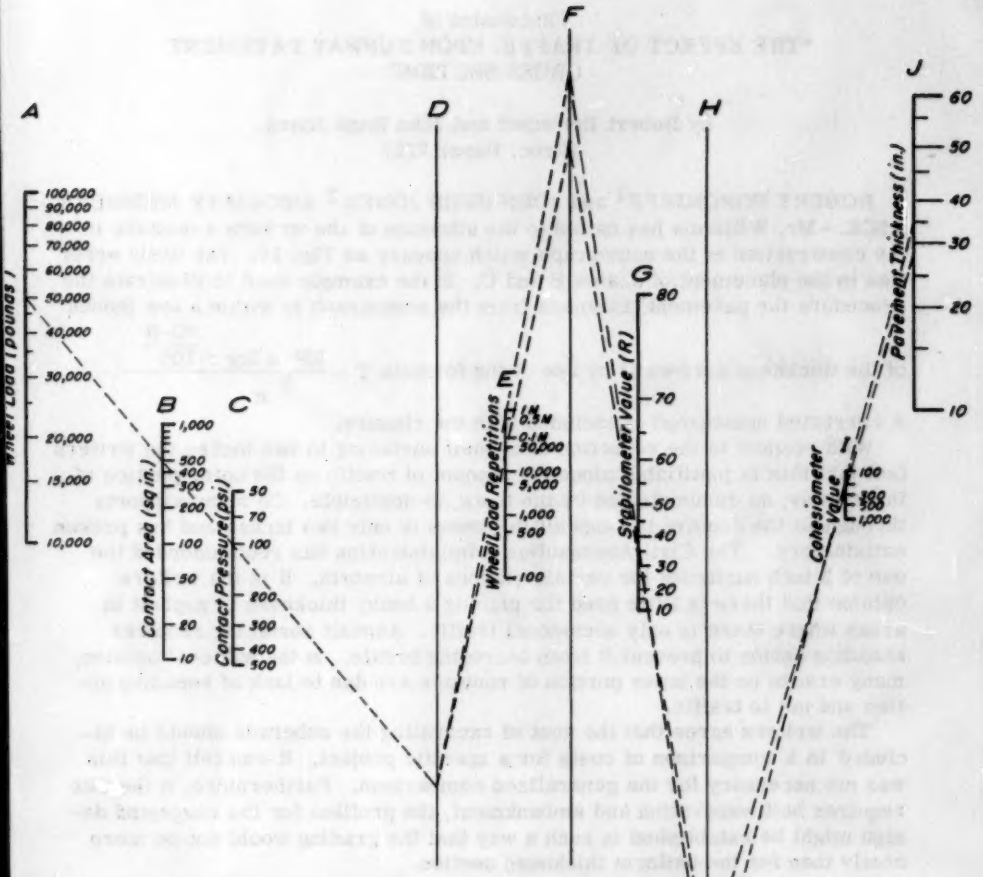

Fig. 10 CALIFORNIA STABILOMETER METHOD PAVEMENT THICKNESS CHART.

Discussion of
"A PATTERN OF INTERSTATION AIRLINE TRAVEL"

by D. M. Belmont
(Proc. Paper 987)

CORRECTIONS.—On page 987-2, line 11 should read: Figs 3 to 10 are strikingly similar. Line 25 on this same page should have the formula changed to $T_{AB} = k \frac{P_A P_B}{D_{AB}}$. Also on page 987-2 line 35 should read: Suppose instead that long-distance travel between A and B is proportional . . . On page 987-3, line 13 should read: Fig 2 and Table 2 also show normalized interstation trips . . .

DIVISION ACTIVITIES
AIR TRANSPORT DIVISION
Proceedings of the American Society of Civil Engineers

November, 1956

This Newsletter is being sent to members of the Society who have designated the Air Transport Division as one of their fields of professional interest. Through this and subsequent issues of the Newsletter, the Executive Committee hopes to encourage greater participation in the activities of the Air Transport Division. The editor would greatly appreciate comments and suggestions from readers.

John Hugh Jones, Editor

MEMBERS OF THE EXECUTIVE COMMITTEE

Dewey S. Wright, Chairman, recently retired

Mr. Wright, City Engineer of Denver, Colorado, served as Secretary of the Executive Committee from October, 1952, until October, 1955, when he was appointed as Chairman to serve until October, 1956.

Joseph D. Blatt, Chairman

Mr. Blatt is Assistant Administrator for Planning, Research, and Development of the U.S. Civil Aeronautics Administration. He has been a member of the Executive Committee since October, 1953. Mr. Blatt also serves as contact member to the Division's Committee to Study Revenue Producing Facilities as a Basis for Airport Financing. Prior to his appointment to the Executive Committee, he served for several years on the Division's Committee on Airports and Airways Planning. Mr. Blatt's term as Chairman began October, 1956.

Terry J. Owens

Mr. Owens, senior member of the Executive Committee served as its Chairman for the two-year period beginning October 1952, and as a member from October 1951. He is contact member to the Division's Committee on the Effect of Jet Fuel on Runway Pavements. For several years, Mr. Owens was a member of the Division's Committee on Airports and Airways Planning. He is professionally associated with the Automotive Safety Foundation of Washington, D.C., where he heads the Urban Highway Department.

Robert Horonjeff

Professor Horonjeff was appointed to the Executive Committee in October 1954 having previously served the Division as Chairman of the Committee

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on Airfield Pavement Overlay Design and as a member of the Committee on Correlation of Runway Design Procedures. He is currently the contact member to the Division's Committee on Programs and Publications. Professor Horonjeff is Professor of Transportation Engineering and Research Engineer in the Institute of Transportation and Traffic Engineering on the Berkeley campus of the University of California.

John M. Kyle

Mr. Kyle is Chief Engineer of the Port of New York Authority. He has been a member of the Executive Committee since October 1954. Prior to his appointment to the Executive Committee he served as a member of the Committee to Study Revenue Producing Facilities as a Basis for Airport Planning. Mr. Kyle is presently the Chairman of the Division's Committee to Study Terminal Facilities.

Ernest W. Carlton

Professor Carlton is the Board of Direction contact member to the Air Transport Division. He is Chairman of the Department and Professor of Civil Engineering at the Missouri School of Mines, Rolla, Missouri.

Clarence E. Harness

Mr. Harness, Assistant Sanitary Engineer of Denver, Colorado, is the Secretary of the Executive Committee.

COMMENTARY ON THE EXECUTIVE COMMITTEE MEETING

The Executive Committee of the Air Transport Division met in Kansas City, Missouri on April 5, 1956 with an agenda of eighteen items before it for consideration. Many of these matters are details of administration of the Division and need not be reported here. However, several of the agenda items concern a large segment of the membership of the Division and are presented as an indication of the type of activity in which the Executive Committee engages, of special interest are those deliberations and decisions which outline the pattern of the future for engineers concerned with air transportation.

One of the most startling discussions centered about the imminence of commercial jet transport operations. The date of January 1960 is generally accepted as the starting date for such operations. The significance of such acceptance is that data for airport modifications for these aircraft must be in the hands of the profession by June 1957. Though the operational requirements of the Boeing 707 and the DC-8 are now available, there remains much in the way of translation of these concepts into data that are suitable for application by airport designers. The membership will be heartened to learn that the Division is active along these lines, the Committee on Terminal Facilities already having concerned itself with several aspects of this jet-transport problem. Further, it is anticipated that later this year there will be available an interim report from the committee which has been studying the effects of jet fuels on runway pavements. Results of the studies of these two committees should materially assist in the matter of translation of scientific data into information of a form usable by practicing engineers.

It will be of interest to members of the Division to note that the Executive Committee considered the possibility of holding a conference on air transport problems. The proposed meeting would be of several days duration and would

differ from the regular Society conventions in that only air transport papers would be presented. In this way it is anticipated that the attendance would be substantially larger than that considered usual for our Division at conventions. At such a Division conference both comprehensive and intensive aspects of air transport problems may be treated without one phase being detrimental to the other. Program planners have long been plagued with this problem and numerable solutions have been attempted. One such palliative measure is the symposium type of treatment, an announcement of which is reported elsewhere in this issue. The Irrigation and Drainage and the Structural Division, among others, have recently staged successful conferences of this type. Through subsequent issues of the Newsletter, the membership will be apprised of developments in this matter.

ASCE CONVENTION--PITTSBURGH, PENNSYLVANIA

October 15-19, 1956

Air Transport Participation

Principally through the efforts of Dr. Robert W. Gerdel, member of the Programs and Publications Committee, the Air Transport Division presented at the Pittsburgh Convention a Symposium on Cold Regions Air Transport Problems. A battery of four outstanding speakers each presented a paper that was followed by prepared discussions. In addition to eminent men in the United States, representatives of Canadian groups were on hand to discuss the papers. Following the formal presentations, each paper was open for discussion from the floor.

The principal speakers and their topics were as follows:

Robert R. Philippe, Chief, Special Engineering Section, Office of the Chief of Engineers, U.S. Corps of Engineers, Research by the Corps of Engineers on Cold Regions Air Transport Problems.

James A. Bender, Snow, Ice, and Permafrost Research Establishment, U.S. Corps of Engineers, Wilamette, Illinois, Testing of a Compacted Runway.

Kenneth A. Linell, Soils, Foundation, and Frost Effects Laboratory, U.S. Corps of Engineers, Watertown Arsenal, Massachusetts, Airfields on Permafrost.

S. Russell Stearns, Professor of Civil Engineering, Thayer School of Engineering, Dartmouth College, Hanover, New Hampshire, Aircraft Operations on Floating Ice Sheets.

Mr. Philippe's paper was discussed by Mr. R. F. Legget, Director, Division of Building Research, National Research Council of Canada. Professor Kenneth B. Woods, Head of the Department of Civil Engineering, Purdue University presented a formal discussion of Mr. Linell's paper.

Mr. Bender's paper was discussed by three experts in this field: Commander T. A. Harwood, Directorate of Physical Research, Defence Research Board of Canada; Mr. George Howard, Technical Director, Engineer Research and Development Laboratories, Corps of Engineers, U.S. Army; and Mr. Henry Stevens, associated with the New England Division of the Corps of Engineers, U.S. Army.

Professor Stearn's paper was discussed by Lt. Col. Louis De Goes, Research Liaison Officer, Arctic, Desert, and Tropic Information Center, U.S. Army.

The Air Transport Sessions were held both morning and afternoon of October 16. It is noted with pleasure that many members of the Division availed themselves of the opportunity to hear these papers and the attendant discussions.

DIVISION DOINGS

Since the publication of the Official Register of the Society in January, 1956, developments have occurred in the Air Transport Division which will interest the membership. The Division's Committee on Heliports, while still in the formative stage, is now endowed with a purpose, namely, "to study the needs and ground facilities for rotary-wing and other forms of vertical take-off aircraft."

Another branch of our dendritic organization is the reconstituted Committee on the Design of Overlay Pavements. The previous committee performed an exemplary job and, in accordance with custom, was discharged with honor upon completing its assignment and presenting its findings in the Proceedings report "The Design of Airfield Overlay Pavements" (Paper No. 777, vol. 81, Proceedings, ASCE). Because of the continuing importance and rapid development of this area, the Executive Committee has nominated the following committee.

Frank M. Mellinger, Chairman; Director of the Ohio River Laboratory of the U.S. Corps of Engineers, Mariemont, Ohio.

Henry Aaron, Chief Engineer, Wire Reinforcement Institute, Washington, D.C.

Henry Litchfeld, Chief, Soils and Pavements Branch, U.S. Civil Aeronautics Administration, Washington, D.C.

L. A. Palmer, Consultant to the Bureau of Yards and Docks, U.S. Navy.

Reginald J. Sutherland, Facilities Engineer, American Airlines, New York.

Robert Horonjeff, Contact Member from the Division Executive Committee.

The Executive Committee, in making these nominations, bids these men diligence, the expenditure of effort, and good fortune in their study.

AIR TRANSPORT CONFERENCE

The Air Transport Division is contemplating a Conference on Air Transport which, if plans materialize, will be held in New York City early in 1957. A two or three day meeting is under consideration. The objective would be the opportunity to present many papers on a variety of air transport topics in a relatively short time.

While still in the preliminary planning stages, it is anticipated that speakers will air their views on such topics as airport financing, master planning,

structural design of pavements, functional design of terminal buildings, fueling equipment and installations, airport marking and lighting, and protection of airport approaches. In addition, an area, as yet undefined, will cover selected problems in the geometric design of airports.

Inasmuch as this is a premiere effort on the part of the Air Transport Division and many of the estimates that must be made are resolved by pure guessing, the assistance of readers of the Newsletter would be appreciated. Will each reader please invest two cents in a postal card and report his first reaction to the announcement he has just read: your comments on subject matter, possible authors or discussers (include yourself if appropriate), and above all, the prospects of your attending this Air Transport Conference in New York City in March or April, 1957, are needed and will be welcomed.

The editor may be addressed as follows: Professor John Hugh Jones, Institute of Transportation and Traffic Engineering, University of California, Berkeley 4, California.

PROCEEDINGS PAPERS

The technical papers published in the past year are identified by number below. Technical-division sponsorship is indicated by an abbreviation at the end of each Paper Number, the symbols referring to: Air Transport (AT), City Planning (CP), Construction (CO), Engineering Mechanics (EM), Highway (HW), Hydraulics (HY), Irrigation and Drainage (IR), Power (PO), Sanitary Engineering (SA), Soil Mechanics and Foundations (SM), Structural (ST), Surveying and Mapping (SU), and Waterways and Harbors (WW) divisions. Papers sponsored by the Board of Direction are identified by the symbols (BD). For titles and order coupons, refer to the appropriate issue of "Civil Engineering." Beginning with Volume 82 (January 1956) papers were published in Journals of the various Technical Divisions. To locate papers in the Journals, the symbols after the paper numbers are followed by a numeral designating the issue of a particular Journal in which the paper appeared. For example, Paper 861 is identified as 861 (SM1) which indicates that the paper is contained in issue 1 of the Journal of the Soil Mechanics and Foundations Division.

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NOVEMBER: 825(ST), 826(HY), 827(ST), 828(ST), 829(ST), 830(ST), 831(ST)[c], 832(CP), 833(CP), 834(CP), 835(CP)[c], 836(HY), 837(HY), 838(HY), 839(HY), 840(HY), 841(HY)[c].

DECEMBER: 842(SM), 843(SM)[c], 844(SU), 845(SU)[c], 846(SA), 847(SA), 848(SA)[c], 849(ST)[c], 850(ST), 851(ST), 852(ST), 853(ST), 854(CO), 855(CO), 856(CO)[c], 857(SU), 858(BD), 859(BD), 860(BD).

VOLUME 82 (1956)

JANUARY: 861(SM1), 862(SM1), 863(EM1), 864(SM1), 865(SM1), 866(SM1), 867(SM1), 868(HW1), 869(ST1), 870(EM1), 871(HW1), 872(HW1), 873(HW1), 874(HW1), 875(HW1), 876(EM1)[c], 877(HW1)[c], 878(ST1)[c].

FEBRUARY: 879(CP1), 880(HY1), 881(HY1)[c], 882(HY1), 883(HY1), 884(IR1), 885(SA1), 886(CP1), 887(SA1), 888(SA1), 889(SA1), 890(SA1), 891(SA1), 892(SA1), 893(CP1), 894(CP1), 895(PO1), 896(PO1), 897(PO1), 898(PO1), 899(PO1), 900(PO1), 901(PO1), 902(AT1)[c], 903(IR1)[c], 904(PO1)[c], 905(SA1)[c].

MARCH: 906(WW1), 907(WW1), 908(WW1), 909(WW1), 910(WW1), 911(WW1), 912(WW1), 913(WW1)[c], 914(ST2), 915(ST2), 916(ST2), 917(ST2), 918(ST2), 919(ST2), 920(ST2), 921(SU1), 922(SU1), 923(SU1), 924(ST2)[c].

APRIL: 925(WW2), 926(WW2), 927(WW2), 928(SA2), 929(SA2), 930(SA2), 931(SA2), 932(SA2)[c], 933(SM2), 934(SM2), 935(WW2), 936(WW2), 937(WW2), 938(WW2), 939(WW2), 940(SM2), 941(SM2), 942(SM2)[c], 943(EM2), 944(EM2), 945(EM2), 946(EM2)[c], 947(PO2), 948(PO2), 949(PO2), 950(PO2), 951(PO2), 952(PO2)[c], 953(HY2), 954(HY2), 955(HY2)[c], 956(HY2), 957(HY2), 958(SA2), 959(PO2), 960(PO2).

MAY: 961(IR2), 962(IR2), 963(CP2), 964(CP2), 965(WW3), 966(WW3), 967(WW3), 968(WW3), 969(WW3), 970(ST3), 971(ST3), 972(ST3)[c], 973(ST3), 974(ST3), 975(WW3), 976(WW3), 977(IR2), 978(AT2), 979(AT2), 980(AT2), 981(IR2), 982(IR2)[c], 983(HW2), 984(HW2), 985(HW2)[c], 986(ST3), 987(AT2), 988(CP2), 989(AT2).

JUNE: 990(PO3), 991(PO3), 992(PO3), 993(PO3), 994(PO3), 995(PO3), 996(PO3), 997(PO3), 998(SA3), 999(SA3), 1000(SA3), 1001(SA3), 1002(SA3), 1003(SA3)[c], 1004(HY3), 1005(HY3), 1006(HY3), 1007(HY3), 1008(HY3), 1009(HY3), 1010(HY3)[c], 1011(PO3)[c], 1012(SA3), 1013(SA3), 1014(SA3), 1015(HY3), 1016(SA3), 1017(PO3), 1018(PO3).

JULY: 1019(ST4), 1020(ST4), 1021(ST4), 1022(ST4), 1023(ST4), 1024(ST4)[c], 1025(SM3), 1026(SM3), 1027(SM3), 1028(SM3)[c], 1029(EM3), 1030(EM3), 1031(EM3), 1032(EM3), 1033(EM3)[c].

AUGUST: 1034(HY4), 1035(HY4), 1036(HY4), 1037(HY4), 1038(HY4), 1039(HY4), 1040(HY4), 1041(HY4)[c], 1042(PO4), 1043(PO4), 1044(PO4), 1045(PO4), 1046(PO4)[c], 1047(SA4), 1048(SA4)[c], 1049(SA4), 1050(SA4), 1051(SA4), 1052(HY4), 1053(SA4).

SEPTEMBER: 1054(ST5), 1055(ST5), 1056(ST5), 1057(ST5), 1058(ST5), 1059(WW4), 1060(WW4), 1061(WW4), 1062(WW4), 1063(WW4), 1064(SU2), 1065(SU2), 1066(SU2)[c], 1067(ST5)[c], 1068(WW4)[c], 1069(WW4).

OCTOBER: 1070(EM4), 1071(EM4), 1072(EM4), 1073(EM4), 1074(HW3), 1075(HW3), 1076(HW3), 1077(HY5), 1078(SA5), 1079(SM4), 1080(SM4), 1081(SM4), 1082(HY5), 1083(SA5), 1084(SA5), 1085(SA5), 1086(PO5), 1087(SA5), 1088(SA5), 1089(SA5), 1090(HW3), 1091(EM4)[c], 1092(HY5)[c], 1093(HW3)[c], 1094(PO5)[c], 1095(SM4)[c].

NOVEMBER: 1096(ST6), 1097(ST6), 1098(ST6), 1099(ST6), 1100(ST6), 1101(ST6), 1102(IR3), 1103(IR3), 1104(IR3), 1105(IR3), 1106(ST6), 1107(ST6), 1108(ST6), 1109(AT3), 1110(AT3)[c], 1111(IR3)[c], 1112(ST6)[c].

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c. Discussion of several papers, grouped by Divisions.

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